The 20-Foot View

By Glen Bull with Joe Garofalo

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In higher education, the number of computer projectors in classrooms has doubled every year for the past five years. A similar trend in K–12 education is occurring now that capable classroom projectors have become available for less than $1,000.

Lessons from Consumer Media Research

At the same time, large-screen displays are becoming common in society. This trend is being accelerated by a transition to high definition television and rapid progress in the evolution of display technologies.

This revolution has not gone unnoticed by Microsoft and Apple. Both firms have produced specialized versions of their operating systems designed specifically for use with large-screen displays. The ways in which consumers interact with a computer monitor at arm's length and with a large-screen display across the living room are considerably different. Microsoft refers to the living room experience as the "10-foot view."

Research conducted by Microsoft has led to development of the Windows Media Center Edition (MCE) of the Microsoft operating system. Apple recently introduced Front Row software designed to provide a comparable experience for Macintosh users.

Because Windows MCE has all the capabilities of the Windows XP environment, with additional multimedia capabilities integrated, this may be worth considering for classrooms with projectors. This represents the beginning of the long-awaited convergence of computers and media.

Beyond the Operating System: Educational Software

Microsoft and Apple have recognized that the operating system must be revised for large-screen use. It will be important to give the same degree of attention to application software employed in school settings—that is, the 20-foot view. Schools are using a variety of large-screen systems; the predominant use currently consists of front-projection systems. Often these are projected directly onto a blank wall. In some instances, electronic whiteboards are being combined with projection systems.

Technology in schools is currently not designed for the 20-foot view. Even though more and more schools are employing large-screen systems, the basic research conducted for effective use by consumers has not yet been undertaken for educational uses. With support from a grant from the U.S. Department of Education, we are currently conducting a series of studies to identify effective classroom uses of these systems.

As we have observed teachers teaching with these systems, it has become evident that employing them effectively is not just a matter of moving software designed for the school lab into the classroom. Students in classrooms often view the screen from a greater distance than experienced in the living room. Often details of educational software viewed from this distance simply are not visible to students sitting in the back.

A series of educational applications by one developer with whom we are working incorporates a banner that covers a substantial portion of the screen. When students are working individually

in the lab these applications are quite effective. However, students in classes using the same applications with a projection system were unable to see the individual details clearly. The banner covers space that might be better employed for display of instructional materials.

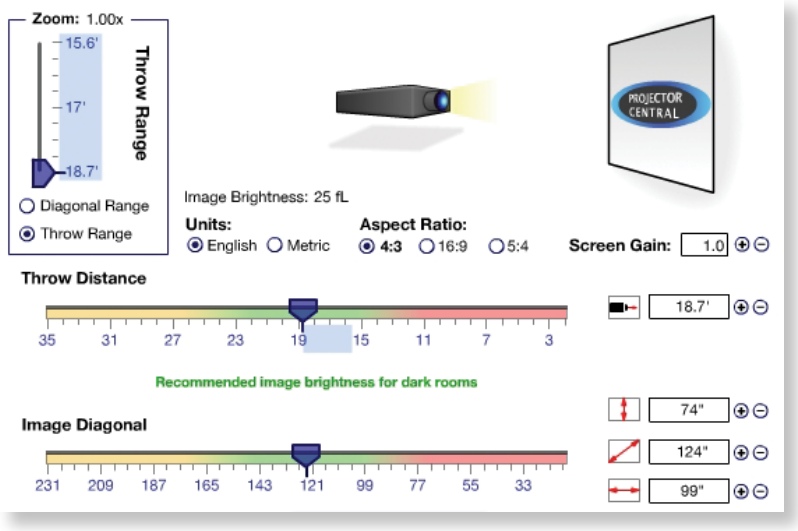
In one classroom we observed a teacher leaning further and further out of the chair as he attempted to see the screen while one of his students gave a whole-class demonstration. He ultimately leaned so far that he fell out of his seat. This mishap certainly has a humorous side, but the educational implications are serious.

Evidence is needed to confirm that new technologies such as these enhance student achievement and learning. If some students cannot see the screen clearly, we run the risk of concluding that the innovation is ineffective when in fact the students (and the teacher) may not be able to read the screen. Teachers and technology coordinators should provide feedback to educational developers to make them aware of revisions needed for effective whole-class use.

Matching the Projector to the Classroom

Software is not the only factor that affects whether a student will be able to see an image from across the room. A projector must be matched to the room size and use for which it is appropriate. This is a more complex topic than it might appear at first. Factors such as focal length, lumens, mode (video, presentation, text), ambient light, and screen type also affect whether projector output is visible.

We previously recommended an invaluable resource that may assist in this process. Projector Central (http://www.projectorcentral.com) offers a "Projector Calculator" that offers this information for a given viewing distance and use. This tool now offers new capabilities, such as the capability



Projector Central's Web-based calculator.

to determine the recommended seating distance for a given throw distance for each projector (see above).

This useful tool allows this type of information to be evaluated for any brand and model of projector, to determine if it is appropriate for a given classroom, and under what conditions. The site lists the top 10 projectors appropriate for educational use based on its independent review criteria. The site also allows schools to register for donations of projectors by businesses, and has been a long-time advocate of schools.

Revising Instructional Approaches

The projector, the operating system, and the educational software affect effective use of large-screen systems for whole-class instruction. Even when all of these factors are aligned, instructional benefits can only be realized when teaching methods are designed to take advantage of the new capabilities. Aspects of teaching that have been affected in classrooms observed include:

- Planning and Preparation
- Lesson Organization and Sequencing
- Teacher Actions

Teachers with these systems who are proficient with appropriate software soon begin to make whole-class visualization an integral part of their lessons.

Teachers who use programs such as PowerPoint and Smart Notebook, as well as subject-specific tools (such as Geometer's Sketchpad for mathematics or Inspiration in the humanities) find that the process of creating lesson files compels them to think more carefully about visualization and sequencing. The software also facilitates revision of lesson sequences. We will provide more detail about the effects that we are observing in a subsequent report.

Summary

Specialized versions of the computer operating systems designed for large-screen use may be worth evaluating for comparable classroom uses. At present, educational developers often do not design or test software for whole-class use. Compatibility with large-screen use should be added to the design checklist of all educational software developers.

Projection systems must also be matched to room size and use. Interactive tools are available to ensure appropriate matches between projector and classroom environment. The instructional methods employed by the teacher represent the most important variable of all.

Ultimately, comparisons are needed that quantitatively measure the benefits of these tools on student learning. When all of these factors are addressed, it will be possible to identify the true benefits and make recommendations regarding best practice.